WebAPI opportunities

Bidirectional information exchange between networks and applications

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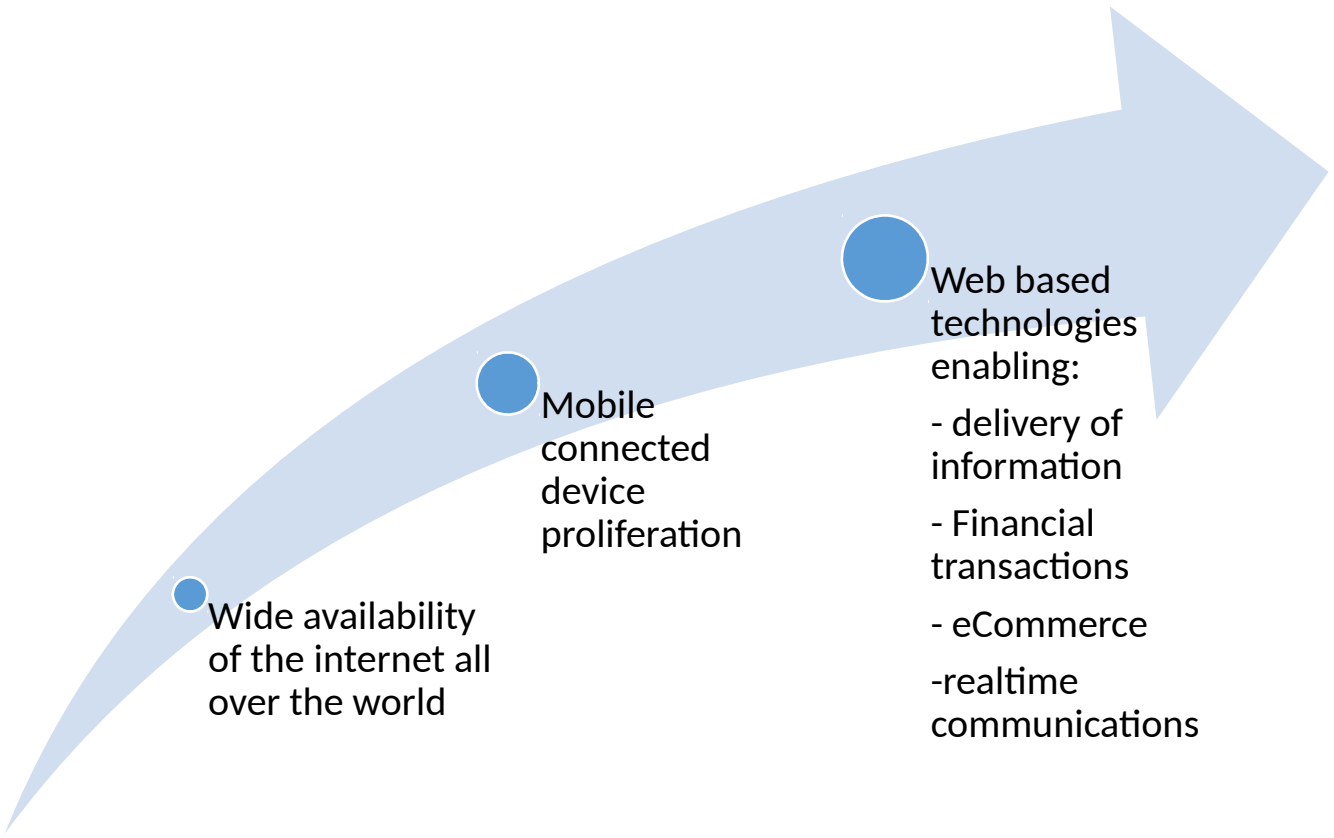
The Web - Tremendous growth leading to sophisticated requirements



Enhance Privacy

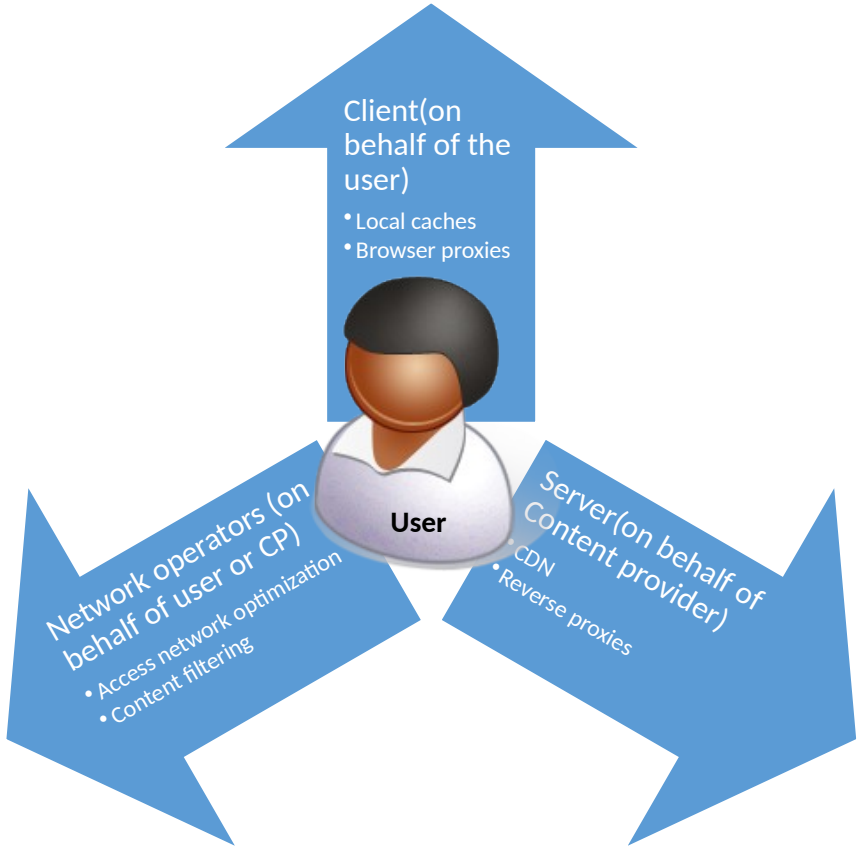
Security
Integrity
Confidentiality
Anonymity

Optimization
Caching
Compression
Adaptability

Decrease latency

Stakeholder perspectives

- **As a site owner and content provider** I want to offer the most cost efficient and reliable way to deliver information and services to my users while preserving their confidentiality, protecting their privacy and the integrity of their data
- **As a network operator** I want to optimize the network resources (spectrum, bandwidth) in order to provide best experience to customers
- **As a user** I want to make informed decisions in regards to whom I trust with my data (at rest or in transit) and have control over what data I share and with whom



Applying solutions for these requirements sometimes generates conflicts

Objectives

- Minimize passive interception and prevent man in the middle attacks
- Allow the client(user) and the server(content provider) to negotiate what and whom they want to give(or not) visibility into their flows
- Improved security and user controlled privacy
- Enable multiple levels of optimization that don’t conflict with each other and meet all parties expectations

Bidirectional information exchange:

- Establish APIs that allow the **network** to provide hints to the application on congestion and other network conditions
- Establish APIs that allow the **application** to provide hints on the flow characteristics without disclosing user sensitive metadata

Why now?

5G brings significant momentum and architectural changes to the networks:

- Virtualization - allows for decomposable and more distributed network functions for programmable networking
- A services based architecture that enables a more efficient and secure way to expose Network APIs

New developments in application and transport protocols :

- Opportunity to build from ground up new explicit ways to carry explicit indicators for the path observers

Dependencies

- Any WebAPIs will require work for protocols and APIs:
  - IETF – transport protocols
  - 3GPP – Network Exposure Functions and APIs
- Additionally for the APIs to be exposed at the Web Platform level, ubiquitous native OS support is required
- Trusting and acting on informational hints will require “cheat-proof” mechanisms that discourage parties to provide misleading info such as LoLa proposal (Low Latency – Low Loss tradeoff)

Application hints and requests

Multi-Path and Multi-Radio management

Current Capability: Application developers can at the mobile OS level choose between:

- Capacity aggregation
- Handover
- Best path / App needs

Or use MPTCP APIs (e.g. iOS API) to leverage Wi-Fi + Cellular connectivity

New Capability: SHOULD be possible for the Application developer to explicitly request support for:

- Carrier Aggregation
- Dual Connectivity

Content Classification

Current Capability: WebRTC developers can use RTCPPeerConnection API to provide relative priority needs for media and data tracks

New Capability: SHOULD be possible to provide hints on whether application traffic is:

- Interactive vs non-interactive
- Latency sensitive vs throughput sensitive
- Prefers low-loss or low-latency

Network hints

- Congestion Info:
  - Mobile Throughput Guidance
  - Allows the application to adapt based on the network availability

Differentiated Network Services

Frontend developers CAN do smart resource preloading (e.g. with Angular).

Usage of the RTCPPeerConnection API implies flows with real-time interactive networking needs

Enterprise admin CAN configure trusted end-user devices with per application QoS marking (e.g. iOS configuration profile – QoS Marking)

For Internet Access Providers: Hints on whether application traffic is

- interactive vs non-interactive
- latency sensitive vs throughput sensitive
- prefers low-loss or low-latency

allows for promising co-optimization approaches respectful of the network neutrality.

For Private Network admins, a configurable and trustable QoS mark would help applying specialized network services to flows from end-user devices.

End-user device Telemetry

Application developers can collect a variety of network related Application QoS metrics.

For example: Youtube Client API, WebRTC getStats, Skype for Business SDN interface

These Application QoS metrics from end-user devices are useful to understand customer perceived quality of network + application and perform network planning, network engineering and network troubleshooting accordingly.

Application developers can collect a variety of metrics related to network characteristics.

For example: CellSignalStrength, WifiInfo

While useful to network operator, access to such statistics is indirect (e.g. through application developers) or not possible (doesn’t scale).

Proposal: Create a Web & Networks Interest Group

- Similar to Media & Entertainment Interest Group

- Mission:
  - Provide a forum to identify use cases and requirements needed to improve the performance and integration of web applications and ~~wireless~~ networks
  - Influence through communication and coordination, the specification development with other W3C groups
  - Promote and drive collaboration with relevant stakeholders and external SDOs to drive harmonization and implementation of the technical specifications
  - Liaison with stakeholders to review recommendations and ensure all security and privacy protection aspects are considered

- Scope:
  - Co-Optimization of network and applications to both run as efficiently as possible
  - Exposure of web interfaces to manage network elements